CORRALLING INDICATOR DATA ON INTERGOVERNMENTAL PROGRAMS

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Paper Presented at Meetings held by

American Evaluation Association
November 2001
St. Louis, Missouri

Agriculture and Agri-Food Canada
November 2001
Ottawa, Ontario
Canada

Abstract

This paper is intended to assist staffs of intergovernmental programs in selecting strategies to obtain indicator data of satisfactory quality for program management and assessment. Agencies of higher-level governments lead *intergovernmental programs* by funding, guiding, and assessing their *intergovernmental projects* which are conducted by agencies of lower-level governments at multiple sites. An intergovernmental program must provide for (a) *order and similarity* across its component projects; (b) *flexibility* for its projects to respond to varied situations; and (c) *indicators* for program *management and assessment*.

Agencies of higher-level governments face several types of barriers in obtaining quantitative information for intergovernmental program management and assessment. These include barriers to (a) employing quantitative indicators that are *common* to all projects of a program, and (b) obtaining *credible* quantitative indicator data from projects. This paper describes and evaluates an *approach that was employed to overcome these two types of barriers.*

The paper describes the information system for a recent intergovernmental program of the United States Department of Agriculture (USDA), i.e., the National Extension Targeted Water Quality Program. The Targeted Water Quality Program's system for management and assessment information generally was consistent with requirements of the Government Performance and Results Act (GPRA).

Indicators for the Targeted Water Quality Program's information system were selected at the *program level*--not at the *project level* nor *jointly at the program and project levels*. Indicators helped to structure and identify *commonalties* across projects as well as *differences* among them--relative to program objectives, scope, outputs, outcome targets and outcomes.

Four of the five indicators for the animal waste management component of the Targeted Program contained *successive options* in order to accommodate wide dissimilarities among objectives, scope, and outputs of the projects of the animal waste component. Regardless of which options were chosen by individual projects, a fifth indicator obtained *standardized* data on outcome targets and outcomes. Closely repeated, multiple requests for upgraded data quality were made to assure that projects submitted indicator data acceptable for inclusion in the national database for the Targeted Program.

An evaluation of the approach employed to select and use the indicators described above is presented. Considering "lessons learned"through the evaluation, the approach employed is suggested for future use under several specified conditions. A series of recommendations is presented to guide selection and use of management and assessment indicators for intergovernmental programs.

Contents

Corralling Indicator Data on Intergovernmental Programs

The purpose of this paper is to assist staffs of intergovernmental programs in selecting strategies to acquire quantitative indicator data from intergovernmental projects. Agencies of higher-level governments lead *intergovernmental programs* by funding, guiding, and assessing their *intergovernmental projects* which are conducted by agencies of lower-level governments at multiple sites.

The paper is intended primarily to help federal agencies strengthen management and assessment of their intergovernmental programs, including meeting requirements of the 1993 Government Performance and Results Act. By inference, the paper also may help strengthen intergovernmental programs led by state agencies and those led by international agencies.

This paper describes *an approach* to selecting and using indicators for program management and assessment. The approach aims at *overcoming barriers to acquiring quantitative indicator data,* and was employed by a recent intergovernmental program, i.e., the United States Department of Agriculture's (USDA's) National Extension Targeted Water Quality Program. The described approach emphasized the use of indicators to help structure, as well as reflect, *commonalties across and differences among* projects of the Targeted Water Quality Program.

Indicators were used to help projects of the Targeted Water Quality Program identify and report: needs to be addressed; priorities and objectives; scope; outputs; and outcome targets as well as outcomes. The approach included procedures to *help assure submission of project indicator data of acceptable quality* for inclusion in the database for management and assessment of the Targeted Program.

Several aspects of indicators on intergovernmental programs are addressed by the indicator selection and use approach described, i.e: *locus* of indicator selection; type of *use* of indicators; and *costs* of selection and use of indicators. An *evaluation* of the cost-effectiveness of the indicators of the described approach cites "lessons learned." The described approach is suggested for use under several specified conditions. *Recommendations* are made for future selection and use of indicators for intergovernmental programs

Background and Issues

In nearly all countries and all policy domains, governments at higher levels and at lower levels cooperate in intergovernmental programs (Toulemonde and Rieper 1997, 1-5; General Accounting Office 1998c, 11; and General Accounting Office 2000, 7). For example, public services by U.S. governmental agencies generally are financed along with, and delivered through, state governmental agencies (Clune 1993; Morra 1997; Skogan and Lurigio 1991). To help achieve their goals, numerous U.S. federal agencies depend on cooperation with state, tribal, and/or local agencies. Such agencies are found in most departments of the U.S. Government, e.g., -- Agriculture; Education; Health and Human Services; Housing and Urban Development; Interior; Justice; Labor; and Transportation--as well as the Environmental Protection Agency.

Intergovernmental *programs* help to define, guide, and fund intergovernmental *projects* at multiple sites. Such projects are developed and conducted at lower levels of government (e.g., by state agencies, state universities, and county agencies), and address specific problems and objectives relative to broadly-stated goals of programs (e.g., of federal agencies). Intergovernmental projects utilize resources received from intergovernmental programs, along with those provided by their own level of government, in order to achieve project objectives and thereby contribute to achieving program goals.

Quantitative indicators specify, with some precision, needs for programs and projects as well program and project objectives and accomplishments. Such indicators can help *manage* (i.e., plan, budget for, and implement programs and projects--as well as help *assess* program and project *relevance and effectiveness* (Blank 1993; Ervin 1997; Hatry 1999). Thus, use of quantitative indicators can help to strengthen program and project effectiveness, marketing, and justification.

Public sector programs in Australasia, North America, and Western Europe increasingly are *managed and assessed through the use of quantitative indicators*. Such indicators serve as a major component of program information systems. In the United States, the Government Performance and Results Act (1993) requires that federal programs--including intergovernmental programs--establish targets and assess progress toward reaching them through the use of indicators. The President of the United States has affirmed a commitment to assess and manage federal programs on the basis of evidence of their performance and results (Executive Office of the President 2001, 3-7).

Barriers to Acquiring Uniform and Credible Indicator Data

Managers of intergovernmental programs face several inter-related barriers to obtaining from intergovernmental projects indicator data that are complete, valid, uniform, and timely (Bennett 1996; General Accounting Office 1997b, 15-16; 1998b, 21; 2000, 5-6). These barriers include:

- *dissimilarity barriers*--intergovernmental projects at different sites *often vary widely*, due to varied state/local social, economic, environmental and/or regulatory conditions; and differing project resources and preferences for addressing them. Wide dissimilarities in projects pose barriers to using *uniform quantitative indicators across projects* in order to develop a nationwide picture of a program's effectiveness (General Accounting Office 1997b, 30; 1998b, 4-5 and 21; 2000, 7-10; and Skogan and Lurigio 1991, 85 and 93).

- *usage barriers*--intergovernmental project staffs often have limited motivation and capacity to provide indicator data that are for use (primarily or solely) by program managers (e.g., DeStefano, Hasazi, and Trach 1997, 126; General Accounting Office 1997, 16; 2000, 5-6; and Peters 2001, 103).

- *legal barriers*--managers of most intergovernmental programs lack statutory authority to compel directors of intergovernmental projects to report project indicator data for program accountability (Frost-Kumpf and Schutjer 1999, 9; General Accounting Office 1998b, 5; 1998c, 11; and 2000, 7-10).

Given *the above challenges* to acquiring quantitative indicator data from projects of intergovernmental programs,[1] the United States General Accounting Office suggests *alternatives* and/or *supplements* to the use of program-wide quantitative indicators in meeting requirements of the Government Performance and Results Act (GPRA). Suggestions include placing major reliance on in-depth program evaluations, studies of demonstration projects, and aggregate data such as vital statistics (General Accounting Office 1998b, 2; 2000, 10).

Barriers to Selecting Indicators Common to Projects

Cooperation between higher and lower levels of government often is necessary for programs to be effective and politically acceptable; however, such intergovernmental *sharing of responsibilities* generally *complicates management and assessment* at both the program and the project levels, introducing tension between these levels[2] (Toulemonde and Rieper 1997, 10-11).

Tension and Balance

Management tension often exists between: (a) need of a *program* to achieve *commonalties* across its projects--to assure that *all* projects respond to (e.g., federal) legislative intent, and (b) needs of *projects* to be *flexible*-- to assure responsiveness to varied (e.g., state/local) legislative intent and varied problematic situations. Thus, there is need for *balance* between program structure and project flexibility.

Accountability tension often exists between differing definitions of relevance and effectiveness by administrators, policy makers, and legislators at higher and at lower levels of government. Thus, assessments of intergovernmental programs, to provide outcome accountability to each co-sponsoring level of government, also must be balanced.

It follows that *indicators* for management and assessment of an intergovernmental program should (a) *promote* commonalties across projects and (b) *allow* flexibility by individual projects. And, such indicators also should *reflect* the actual degree of commonalties across, and variations

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[1] Difficulties in acquiring indicator data may be a reason that evaluators seldom have examined the effectiveness of intergovernmental programs (Rist 1997). Evaluation of multi-site programs financed entirely by one sponsor (e.g., a federal agency)--with projects intended for implementation in the *same way* across sites--is not uncommon; however; evaluation of multi-site programs with *co-financed* projects (e.g., by states/counties) and intended for implementation in *different ways* across different sites *is* uncommon (Turpin and Sinacore 1991; Sinacore and Turpin 1991).

[2] The comparison is with programs that are funded, planned and implemented by (a) an agency within a single level of government, or (b) an agency that exercises line-authority over its projects that work within the environment of a lower level of government. In intergovernmental programming, project managers *negotiate* their projects' objectives, implementation, and reporting processes with the higher governmental level. In contrast, line agencies are more able to *control* projects conducted by their lower-level units.

among, the projects of a program relative to objectives, scope, outputs, outcome targets and outcomes. These balances must be struck while requiring only a reasonable amount of resource expenditure for indicator selection, data acquisition and analysis.

Locus of Indicator Selection

Within the context of the above types of tension and needs for balance, an intergovernmental program faces the question of *locus* of indicator selection. An intergovernmental program may rely on one or more of the following alternative approaches to providing data on *common features across* its projects and *variations among* them. Alternative one is *program-level selection* of indicators. Alternative two is *project-level selection* of indicators. And alternative three is *joint-selection*; i.e., the program and the project levels come to *a consensus* on indicator selection.

- In the *program-level selection* approach, staff at the program level select management and assessment indicators for use by projects (Rieper and Toulemonde 1997, 154-155). Such indicators may have high relevance to *program* management and assessment and may be *quickly establish*ed; but program-selection of indicators is not likely to fulfill informational needs at the project level (Bennett, Paisley, Rogers, and Warner 1981; Feller 1995, 22; Frost-Kumpf and Schutjer 1999). Such inadequacy is likely to exacerbate difficulties encountered by staff at the program level in obtaining indicator data: project managers generally have limited willingness to expend project resources to acquire and report indicator data that are needed primarily or only at the program level (Bennett 1996; DeStefano, Hasazi, and Trach 1997, 137).[3]

- In the *project-level selection* approach, staffs at the project level select management and assessment indicators for project use. Project indicator data may be stored in a "datamart" and coded according to categories of a program-level framework (Agosta 1999; Ladewig and Murphy 2001; Nealon and Yost 1999; and Nealon 2000). Staff at the program level retrieve and analyze project-selected indicator data in cross-site fashion, in so far as possible. Project-selected indicator data are not likely to fulfill informational needs at the higher level of government due to: irrelevancies of project-level indicator data to program-level informational needs; dissimilarities in types of data collected by different projects; and uncertainties in quality of data (Feller 1995, 22; National Collaborative Project on Indicators for Sustainable Agriculture 1998). Synthesis of project-level data having disparate characteristics may require considerable time and expertise.

- In the *joint-level selection* approach, staffs at the program and project levels select management and assessment indicators collaboratively (Rieper and Toulemonde 1997, 152-154). A collaborative approach can meet needs for management information and reporting at the program and project levels; it *potentially maximizes* the intergovernmental

[3] Where indicators are selected at the program level, each intergovernmental project *also* may use *its own* project-level indicators for its respective project management as well as state/local accountability (e.g., Bennett, Paisley, Rogers, and Warner 1981; Frost-Kumpf and Schutjer 1999).

partners' joint commitment to and support for the selected indicators[4] (Feller 1995, 22; Barley and Jenness 1993). Joint-selection may build capacity for higher efficiencies in intergovernmental program and project management and assessment, i.e., promote multi-institutional empowerment in indicator selection and use. However, in trying to satisfy differing informational needs at lower and at higher governmental levels, joint-selection may require: (a) major *compromise*s that unacceptably weaken indicator relevance to each level; and (b) broadened *scope* and increased *complexity* of the indicators, unacceptably raising their cost of use. These factors--as well as added time requirements to develop an intergovernmental consensus--may jeopardize at both levels the relevance, practicability, and timeliness of information from jointly-selected indicators for program management and assessment (Toulemonde and Rieper 1997, 15-22).

An Approach to Indicator Selection and Use

USDA's National Extension Targeted Water Quality Program employed a form of the program-level approach to selecting indicators for common use by its projects. The approach addressed *selection and employment* of indicators for program management and assessment, and *illustrates* indicator use to structure as well as reflect project commonalties and diversities. The approach is largely consistent with the perspective and requirements of the Government Performance and Results Act.

National Extension Targeted Water Quality Program

As with many other types of programs, conducting effective and appropriate *nonformal information transfer and education* programs often entails cooperation by two or more levels of government. Such intergovernmental cooperation in nonformal information transfer and education occurred in the National Extension Targeted Water Quality Program (Marshall and Bennett 1998).[5]

The Targeted Water Quality Program was initiated and managed by the USDA's Cooperative State Research, Education, and Extension Service (CSREES). In order to achieve its national goals for water quality, CSREES funded and guided cooperative agreements with land-grant university state Extension Services to conduct water quality projects. The CSREES and its Extension Service partners in all states are included in the Cooperative Extension System.

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[4] *Joint* selection of indicators is exemplified by a private foundation's approach to indicator selection. The foundation's programs fund a bevy of projects and both are to be evaluated via "cluster evaluation" (Barley and Jenness 1993). Cluster evaluation builds toward consensus on *core* indicators or measures (applicable to all the projects of a program), while each inter-related project also uses its own, unique indicators.

[5] Nationally, the need for the Targeted Water Quality Program was based on impairment of more than an estimated one-third of the assessed surface waters in the U.S. Agricultural chemicals and animal wastes, among other major sources, contribute significantly to non-point sources pollution of surface and ground-water resources (US EPA 2000). Moreover, the purity of water from a substantial number of rural residential wells is impaired by agricultural pollutants (Economic Research Service 1997).

The Targeted Water Quality Program constituted part of a test to help formulate national water quality policy (U.S. Department of Agriculture and Cooperating Agencies 1989). The program was part of a Presidential Initiative to determine whether several, identified departments of the federal government including the USDA--together with their respective state governmental and university partners--could gain agricultural producers' *voluntary adoption* of practices and technologies *sufficient* to adequately prevent/reduce water degradation from non-point source agricultural and related contaminants.[6]

CSREES defined *national goals* for the Targeted Water Quality Program within the context of the Presidential Initiative: the intent was not simply to add federal funding to support an array of state and local projects. State/local (hereafter called "state") projects of the Targeted Water Quality Program addressed national program goals set by CSREES.

The five program goals of the Targeted Program were to be achieved by effecting *voluntary actions* of agricultural producers, rural communities, and rural families. The goals were to:

- reduce or prevent water pollution from (a) wastes of farm animals, (b) nutrients (fertilizers) for plant production, (c) and pesticides for crop production and protection;

- protect or improve water quality through collective action; and

- protect or improve quality of drinking water of private domestic-use wells.

Project participation in the Targeted Water Quality Program was open to the Cooperative Extension Services[7] in the 57 states and territories (hereafter "states") in the United States. Extension Services in 53 states chose to establish cooperative projects with the Targeted Program. To have become a cooperator in the Targeted Program, a state Extension Service was required to

at least *match* (with non-federal dollars and/or in-kind resources) the amount of funding its water quality project was eligible to receive from CSREES.

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[6] Public sector programs promoting *voluntary* adoption of agricultural technologies and practices to ensure water quality have been somewhat effective (Verma and Bennett 1993, Mostaghimi et al 1997, Nowak et al. 1997a, and Ribaudo 1997). However, voluntary adoption has been *insufficient* to safeguard water quality from nonpoint contaminants. Currently, there is increased emphasis on *regulatory approaches* to control agricultural pollution of water resources, as well as increased voluntary efforts (e.g., Executive Office of the President 1998; Napier 1996).

[7] Cooperative Extension Services (CESs) of U.S. land-grant universities include staffs at the state level and at the multi-county and county levels. Through legislation, CESs cooperate with county governments and the U.S. Department of Agriculture to conduct programs of nonformal (not-for-academic credit) education, information transfer, and technology/practice adaptation and adoption. Goals are to improve agriculture, conserve natural resources, and develop youth, families, and communities through increasing potential users' awareness of, interest in, positive evaluation of, and rate of adoption of research-based, recommended management practices and technologies.

State Extension Service projects set specific objectives relative to the goals of the Targeted Program. Each state's water quality staff chose project objectives, activities, and clientele that *it considered as most relevant, within its state,* to achieving program goals: project staffs were not constrained by program criteria in making such choices for their respective projects, as is the case within some intergovernmental programs (General Accounting Office 1998b, 15-19).

The 53 participating state Extension Services developed and conducted a total of 238 projects. The number of state projects selecting each of the national program goals to address was as follows: management of farm animal waste--47 states; of commercial nitrogen fertilizer--46 states; and of pesticides--43 states; public issues education for collective action--46 states; and drinking water quality--31 states. Twenty-five states chose one or more projects addressing objectives beyond the scope of the program goals (e.g., to decrease salinization of surface water). Thus, 11 percent of the state projects exceeded the scope of the goals of the Targeted Water Quality Program (Marshall and Bennett 1998, Vol. One, 5-6).

The openness of project selection and design choices available within the Targeted Program--along with the strong contribution of state resources to the selected projects--ordained that the Targeted Program would (a) carry the type of intergovernmental tension cited above, and (b) need to balance indicators for management and assessment across program and project levels.

Agency Policies for Indicator Selection

By employing program-level selection of indicators, the Targeted Water Quality Program conformed to 1992-1997 policy for CSREES's national extension program management and assessment system--i.e., its Program Planning and Reporting System (PPARS). Under PPARS, indicators for all 22 national extension programs were selected by CSREES.[8] PPARS promised to *efficiently* provide generalizations about the performance of all these 1992-1995, national programs[9] of the Cooperative Extension System, including the Targeted Water Quality Program.

PPARS' program-level approach to selecting indicators was, in part, a CSREES reaction against *limitations* of the previous policy for a *project-level* approach to selection of indicators for national extension programs (1982-1991). In the previous approach, the Narrative

[8] State Cooperative Extension Services (CESs) concurred with the policy of selection of CSREES selection of indicators, with assurance that the indicators would be few in number. Such concurrence served to reduce state CESs' overall volume of reporting to CSREES: prior to PPARS, state Extension Service reports to CSREES covered the entire scope of state/county programs. PPARS required reporting of only that state Extension work relative to the 22 national programs identified by CSREES, 1992-1995.

[9] PPARS' promise generally was unfulfilled. In nearly all the 1992-1995 national programs identified by CSREES, indicator data submitted by state projects was of such low quality that it was unuseable. Lack of a CSREES-wide policy to monitor the quality of project-submitted data permitted the poor quality of most PPARS databases (Bennett 1996).

Accomplishment Reporting System (NARS),[10] state Extension staffs reported to CSREES their respective project plans and attendant accomplishments according to indicators selected at the *state (project)* level.[11] NARS often provided helpful case studies, but it lacked program-level utility because such state and local cases usually could not be *effectively* or *efficiently* categorized and synthesized for national program planning, budgeting, and assessment (Bennett 1986; Tate 2001).

Even if relevant NARS reports were effectively retrieved from their national database, such reports had to be *synthesized* to be of significant help for multi-state, regional, or national generalizations. The *time inputs* required by CSREES national program leaders and support staffs for such retrievals and syntheses usually were not affordable, and the difficult process of completing syntheses was judged to be too slow.[12]

To correct the above limitations of NARS a replacement system, PPARS, was developed. PPARS required state projects to provide data in response to indicators selected at the program-level. Similar to requirements of GPRA, PPARS established a multi-year cycle of strategic planning (1992-1995) along with annual performance objectives and annual progress reports. Indicator data from each state project were contained in its:

- *four-year plan-of-work,* submitted to CSREES at the beginning of federal fiscal year 1992;
- *annual plan-of-work updates,* submitted at the beginning of each fiscal year 1993-1995; and
- *annual accomplishment reports,* submitted at the close of each fiscal year 1993-1995.

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[10] NARS included the following features: (a) reporting of extension staff time allocated to "major programs" of the state-- later coded according to forty national programmatic categories; (b) reporting of narrative and quantitative information needed by CSREES (e.g., types and examples of output and impact data); and (c) full-text search, for users of the NARS database,via (then) state-of-the art electronic technology for national database development and utilization.

[11] NARS' emphasis on project-level indicators was, in turn, due to disenchantment with and discontinuation of CSREES' 1969-1981 Extension Management Information System (EMIS). EMIS required state Extension Services to report their project plans and accomplishments via *program-level* indicators. These indicators required *precise* reporting of project inputs (time allocations) and outputs (types and numbers of activities conducted; and types and numbers of project participants). State CESs considered the costs of such precise reporting to be excessive (Bennett 1996).

[12] An example was the preparation of a report on CSREES's 1988-1991 water quality program--including a national profile of state projects' inputs, activities, and associated outputs with selected case examples. For the preparation of this report, it was necessary to expend *0.3 full-time equivalents* of CSREES expertise just for the data retrieval, analysis, and synthesis. This amount of effort was necessary to prepare for writing a national report based on the available assortment of project-selected indicator data (Verma and Bennett 1993).

Indicators for Targeted Water Quality Program

Completing a *plan-of-work* form (electronic) for a project of the Targeted Water Quality Program included providing indicator data that identified: (a) agricultural threats to water quality in an identified geographical area; (b) project priorities and intended outputs; and (c) quantitative outcome targets. Completing an *annual accomplishment report* form included providing indicator data that identified quantitative outcomes associated with project implementation as well as narrative descriptions of outcomes. CSREES *approval* of a project's annual plan-of-work and accomplishment report served to *merit* the project's receipt of its annual share of CSREES funding for the Targeted Water Quality Program.

The term "indicator" may be *generically* defined as "pointer." Data-sets *point to* situational needs for projects as well as their priority objectives, scope, outputs, and associated outcomes. Indicator data herein include quantitative data, supplementary qualitative data (focused narratives), and geographic maps.

Indicators for the Targeted Program were selected during a short time-frame. Administrative decision to implement PPARS for the Targeted Program *was made only three months* before its indicators were to be used by projects to guide their participation in the Targeted Program; this provided time for only *minimal* involvement of project staffs in selection of indicators.[13]

Program-level indicators for guiding completion of project plans-of-work and accomplishment reports were selected so as to (a) help *structure* and *identify commonalities* across projects as well as *variations* among them, and (b) *minimize resources* required for project reporting to CSREES. Indicators supplied *options* to projects in order to achieve both (a) and (b) simultaneously.

A large quantity of indicator data for the overall Targeted Water Quality Program was collected and analyzed (requiring a six-volume report--Marshall and Bennett 1998). Therefore, the scope of this paper is *delimited to describing the indicators for only one* of the goals of the overall program: i.e., the goal *to reduce/prevent water degradation from wastes of farm animals* (Marshall and Bennett 1998, Vol. Two). Indicators and their use relative to the animal waste goal/component of the national program *illustrate* the nature, logical progression, and use of indicators for *all five* components of the Targeted Water Quality Program (Appendix A diagrams the scope of and inter-relations among the five components and types of indicators for each).

Indicators for Animal Waste Management

Plans of work and accomplishment reports for the animal waste component of the Targeted Program included a progression of five indicators. The first *four* indicators each provided *options*

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[13] As CSREES selected the Targeted Program's indicators, it *sought and received advice* from a few selected staff members of Extension Services in several states (see Acknowledgments). To have fully involved state Extension Service staffs in *CSREES* selection of a set of indicators for the Targeted Program would have required at least six months' duration, as well as considerable financial inputs from both CSREES and state Extension Services.

for type of project participation. CSREES guidelines facilitated project staffs' selections from among the options provided. Data of these four indicators identified options chosen by projects including their priority *objectives* and *outputs*. The fifth indicator was used to identify both an *outcome target* for, and an *outcome* associated with, project implementation.

The following describes each of the five indicators for the animal waste management portion of the Targeted Program, rationalizes its selection, and illustrates its utilization. Special attention is paid to the *options supplied by the set of indicators* that helped them to both structure and reflect project commonalties as well as variations among projects. *Assuring quality* of submitted indicator data was given special attention, including *encouraging project* staff to obtain and report indicator data of sufficient quality

Information from the five indicators had value for CSREES *management*, i.e., program planning and budgeting, coordination and guidance, and assessment. Indicator information had value for program *accountability*, i.e., reporting to USDA, other federal agencies, and the Congress.[14]

First Indicator: Connection to Program Goals

The first step in completing a plan-of-work was to determine whether the overall water quality project of a state Extension Service would address the CSREES program goal of reducing or preventing water pollution through animal waste management. CSREES expected a state's water quality staff to choose this goal if it was applicable within the state. Thus, indicating "*intent to participate*" toward achieving the animal waste management goal, among the five goals of the national program, was the *first option.*

In responding to the "intent-to-participate" indicator, state extension water quality staff determined whether a significant water quality problem due to animal waste existed within their state. *If so*, and if sufficient resources were available for an animal waste management project (in addition to addressing other goals that the state staff placed in high priority), *then* the water quality staff signaled their intent to participate toward achieving the animal waste management goal. By indicating such an intent, a project committed itself to respond to the *other four national indicators* of the animal waste management component of the Targeted Program.

[14] However, before the information from this management and assessment information system could be fully utilized, the 1992-1995 Target Program was radically restructured in 1996, for administrative reasons. The program was again radically restructured in 2000 for legislative reasons.

Figure 1. Location of Animal Waste Management Projects by Species Most Associated with Threats to Water Quality

Of the 53 state Extension Services that participated in the Targeted Program, 47 *chose* to participate in the animal waste management component of the program, i.e., these states chose an animal waste management component within their overall water quality project. States in which the 47 projects for managing wastes of farm animals were located are displayed in Figure 1.

The "intent-to-participate" indicator had two functions:

C providing each state Extension Service with *flexibility* to apply its share of federal Targeted Program funds to the *highest priority needs* for water quality programming in its state relative to the five national program goals (or to another goal, besides the five, that a project could appropriately rationalize).

C providing CSREES program managers with information on the distribution of state priorities relative to the Targeted Program' five national goals; such information helped CSREES to (a) be accountable to USDA--i.e., demonstrate the extent to which project objectives were addressing the animal waste management goal of the Presidential Initiative, and (b) facilitate coordination among the states having similar priorities.

Second Indicator: Priority Objectives of Projects

Next in completing an animal waste management plan-of-work, a project's staff identified the *particular animal species/waste most threatening* to water quality in their state. A project *reported* to CSREES its efforts, and progress made, relative to only this *single type of animal*

waste most closely associated with water quality degradation in its state. Projects were expected to *address all the relevant types of animal waste* in their state, but *to report federally on only* the top priority animal waste as defined above.

This narrowing of reporting requirements to each project's *top priority animal waste objective* (species source) had the following merits.

- Projects could *focus* their limited data collection resources--to enable reporting of *specific, substantive, meaningful data* in response to indicators three, four, and five (see below). Such focusing helped to *avoid* vacuous, meaningless, "global" indicators that sometimes are employed in reporting systems, e.g., "total number of animal waste management practices adopted by producers."

- Projects could *minimize* the amount of data they reported to CSREES. State partners in the Targeted Program provided at least one-half, and in some states up to three-quarters, of total resources for projects. It was important to *balance* CSREES requests for indicator data with the extent of federal resources contributed. Monitoring waste management efforts and progress across *all* the species encompassed by an animal waste management project clearly would have required excessive resources from the state Extension Service.

- Program managers could capture information on regional and national *priorities for animal waste management* through cumulating states' identification of their *most problematic* types of animal waste including animal species from which it came. Projects could be sorted into types, i.e., clusters of projects addressing the same type of animal waste posing the greatest threat to water quality.

Dairy cattle's waste was the top priority animal waste addressed nationally. Twenty-four of the 47 states that selected animal waste management projects indicated that dairy cattle's waste was "the type of animal waste expected to pose the *greatest* threat to water quality during the next four years" (Figure 1). The other categories of animal species identified as threats--beef cattle, poultry, swine, and mixed livestock--(the latter referring to two or more of these species predominating on the same farmsteads) were selected less frequently.

Waste problems created by dairy cattle were due mainly to their large concentrations in small geographic areas. The following *examples of initial problems* were among those cited in narrative form by two of the *projects that focused on dairy cattle's waste*. These two examples were reported in 1992 from within the Northeast Region and the North Central Region of the U.S., respectively.

> ". . . frequent occurrences of bacterial contamination are found in rural drinking water wells. Most of these contaminations come from improper management of dairy cattle's waste: nitrate levels in wells tend to be higher where herds of dairy cattle are concentrated."
>
> A state survey found that ". . . because they lack facilities to store manure, many small producers depend on daily scrape and haul for manure management, even during weather not conducive to

spreading manure on their fields. Additionally, most milk producers do not analyze their herd's manure for its plant nutrients, nor do they credit manure applications in soil fertility management; lack of use of these practices leads to excess nitrogen fertilization of crops."

Most of the following discussion is *further delimited to only* the 24 projects that focused on dairy cattle's waste. Indicator data and their uses relative to these 24 projects are intended to *illustrate* the nature and logical progression of analyses regarding the other four animal species/wastes addressed by the animal waste management component (Marshall and Bennett, 1998, Vol. Two).

Third Indicator: Project Geographic Areas

The third step in preparing an animal waste management project plan-of-work for was for project staff to delineate a specific *geographic area* in which to combat animal waste threats to water quality (i.e., in the 24 projects being followed, from manure of dairy cattle). Plans-of-work included showed geographic locations of projects; these were marked on standard state maps supplied by CSREES. Geographic areas tended to be multi-county watersheds.

CSREES had a three-part rationale for requesting projects to delineate their respective within-state geographic areas:

- delineation encouraged projects to focus Targeted Program resources on the most *gravely threatened* geographic areas in their respective state, with liberty to determine the geographic scope of their respective project area;

- delineation was intended to *further ease the collection and reporting of specific, valid, substantive indicator data*[15], and;

- delineation served to *reduce the cost of project assessments*, since collection of indicator data could be confined to designated geographic areas.

The geographic areas delineated by the projects which focused on management of dairy cattle's waste are depicted in Figure 2. Of the 24 state Extension Services which identified dairy cattle's waste as the type of animal waste expected to pose the greatest threat to water quality in their respective state, 21 states delineated their respective projects within multi-county geographic areas (three projects failed to delineate and report sub-state project areas, and instead reported state-wide project areas).

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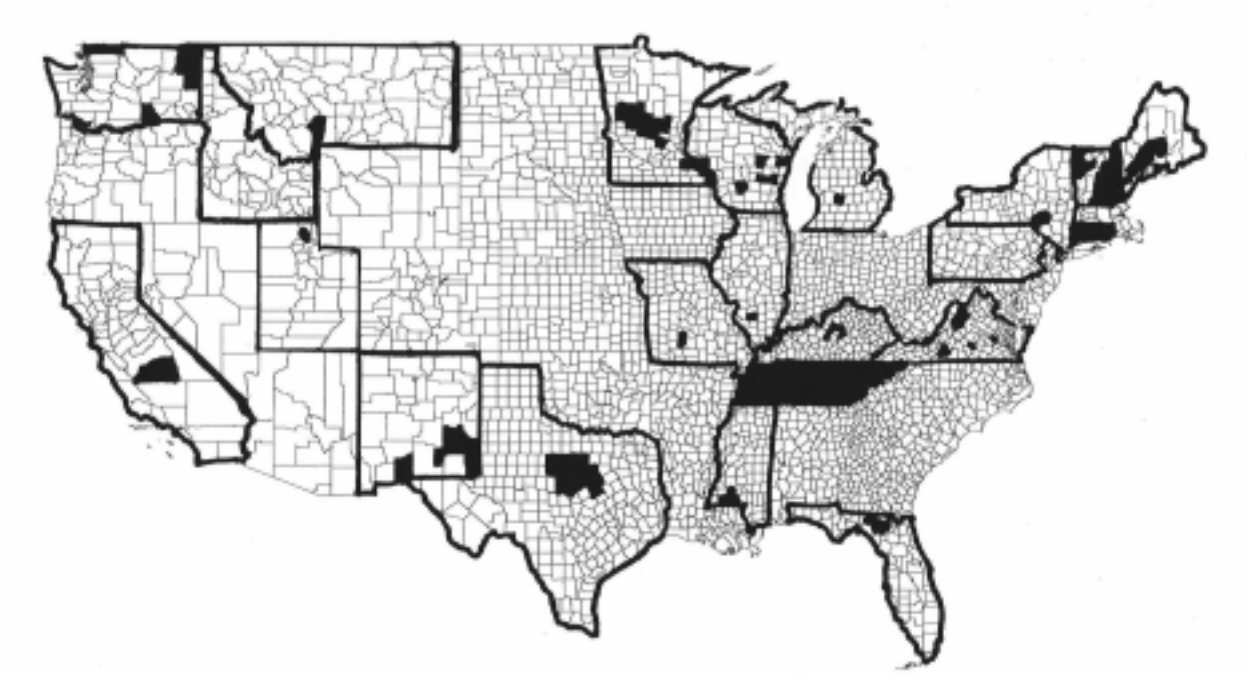
[15] Data on indicators four and five reflected *average* conditions within the project areas. An average reflecting a geographic area generally is not meaningful if the area contains large site-specific variations. Thus, indicator data representing *delimited areas* were preferred to those representing large, undifferentiated project areas. A *constricted* geographic area for a project generally facilitated meaningfulness of indicator data by reducing the variability around the reported mean value.

Figure 2. Geographic Areas of Projects Addressing Dairy Cattle's Waste as Greatest Animal Waste Threat to Water Quality



Fourth Indicator: Project Outputs

The next step in preparing a plan-of-work was to indicate intended project *outputs*. Output data were submitted regarding:

- the three *highest priority animal waste management practices* recommended for voluntary adoption by animal producers in a project's geographic area[16] and;

- the *methods employed* to involve producers in considering adoption of these priority practices for recommended use.

On the plan of work form, CSREES provided lists of (a) recommended animal waste management practices and (b) methods of conducting extension projects. These lists facilitated projects' indication of their highest priority recommended practices and highest priority methods for involvement of producers in project activities: project managers selected from the lists entries for their data responses to these two output indicators. Reporting rationale for selection of a particular priority of management practices and extension methods was not requested.

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[16] Based on prior research, the adoption of a *combination of such practices*--as appropriate to the situation--was expected to reduce water contamination from animal wastes through permitting high concentrations of large numbers of animals without adversely affecting the quality of surrounding water resources.

Rationale for CSREES requests for project reporting of only the *three highest priority recommended practices* was: (a) such data enabled program managers to ascertain and describe the most important activities or outputs of the animal waste management component of the Targeted Program, while (b) minimizing project resources required to report on these program outputs.

The priority practices that were recommended for dairy producers' adoption varied across the 24 projects designed to improve management of dairy cattle's wastes. The high priority practice *most frequently recommended for adoption* was "planning land applications of waste relative to nutrients needed by crops." Use of specifically-recommended methods to minimize waste runoff from dairy herd sites, and timing and rates of land application of waste were tied for second place (Table 1).

Table 1. High Priority Practices Most Frequently Promoted by Projects Addressing Management of Dairy Cattle's Waste

Animal Waste Management Practices Promoted	(24 State Projects Participating) Number	Percent
Plan amount of land application of waste relative to nutrient budgeting for crop production	14	58%
Minimize waste runoff from standing, feeding, and watering sites, e.g., use filter strips around sites	12	50
Consider timing and rates of land application of waste	12	50
Upgrade existing manure holding facilities	11	46
Construct new manure holding facilities	8	33
Test manure for unit amount of plant nutrient content	5	21

The *methods* chosen to involve dairy producers in learning about and considering adoption of the recommended waste management practices also varied across the 24 projects. The *frequencies of methods* chosen for promoting high priority practices are shown in Table 2. The frequencies sum to more than 100 percent, as all projects used multiple methods. Group meetings were the highest priority method employed.

Data on priority practices and extension methods was collected mainly to provide descriptive information on the delivery approaches of the animal waste management component.

Table 2. Methods Most Frequently Employed to Promote Producer Use of High Priority Practices to Manage Dairy Cattle's Waste

Methods to Promote Producer Use	(24 State Projects Participating) Number	Percent
Group meetings (conferences, etc.)	20	83%
Publications (including newsletters)	18	75
Demonstrations (including field days)	18	75
One-to-one contact by extension personnel	11	46
Collaboration with other agencies	11	46
Mass media use	5	20

Fifth Indicator: Quantitative Outcomes

Unlike the first four indicators, the fifth *did not provide optional selections:* a *standardized* indicator *obtained data on intermediate outcomes*[17] associated with project outputs. Standardization of the indicator permitted *aggregating* outcome data not only for all projects to manage dairy cattle's waste, but also for all 47 animal waste management projects *regardless* of animal species chosen for reporting.

The standardized outcome indicator for animal waste management projects was as follows: *percentage* of animal units (AUs)[18] for which producers employed *waste management practices adequate to hold animal waste runoff and/or infiltration to an acceptable level*. The outcome

[17] Ideally, outcome indicators for the Targeted Water Quality Program would have reflected *final* outcomes or *extent of problem reduction or solution*. Indicators of final outcomes would have gauged (a) extent of increased protection or improvement of quality of nearby surface water and groundwater, as well as (b) impacts on the uses of such water (U.S. Environmental Protection Agency 1996). However, resource limitations of the assessment--including the brief, four years' duration of the Targeted Water Quality Program--confined outcome indication to patterns of *animal producers' behavior that generally affect water quality*, i.e., *intermediate* outcome indicators (see Appendix A).

[18] *Prior availability* of the animal unit (AU) measure facilitated selection of the outcome indicator. An animal unit (AU) *standardize*s the number of animals in any given farm animal species that are equivalent in manure production/potentcy to one steer beef animal weighing 1,000 pounds (U.S. Environmental Proctection Agency 1975). The appropriate AU conversion rate was used to calculate the number of *AUs* in each project area. For example, the total number of dairy cattle in a project geographic area was multiplied by the factor 1.4 to calculate the number of dairy cattle AUs in the area.

indicator was based on an understanding of: "what behavior by livestock producers *was likely* to result in their animals *not contributing* to water pollution."

The percentage of AUs to which producers had applied such "adequate" waste management practices was tracked within *each* of the 47 animal waste management projects. Percentage of AUs covered by "adequate" waste management practices, *within a project's area,* was the quotient of two variables: (a) number of AUs of an animal species for which producers used recommended "adequate" practices divided by (b) total number of AUs of the species located in the project area (an indication of magnitude of pollution potential and total need for use of recommended practices).

CSREES had insufficient capacity to devise a *specific, standard methodology* by which state projects would obtain outcome indicator data: much expertise and time would have been needed in order to build a common, specific methodology that could be accommodated to varied types of projects and the varied conditions within which projects operated. Therefore, CSREES guidelines for collection of outcome indicator data permitted each project to choose its own *operational-definition* of the outcome indicator so as to guide data collection within its project area, e.g., *criteria* for defining "acceptable behavioral patterns" regarding producers' management of animal wastes.[19] CREES guidelines also permitted each project to choose its own *sources* of outcome indicator data (Appendix B reports the frequencies of types of data sources on which projects said they would rely).

Projects used the standardized outcome indicator in two ways, as follows.

C Each project--at its plan-of-work baseline--set a *quantitative target for outcome* to be achieved by the end of the plan-of-work period.[20] The standardized indicator permitted *averaging*

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[19] Absence of a standard procedures by which to *collect* outcome data and *verify* its validity means that *only limited to general confidence* can be placed in the outcome data. For the outcome indicator, individual projects defined the *specific combinations* of best management practices that were "considered adequate to prevent runoff and infiltration to an acceptable level." Likewise, individual projects *selected their own source(s) and method(s) for collecting data* on the quantitative outcome indicator. Across the projects, the two top-ranked sources of data on adequacy of coverage of AUs were: "public sector agencies other than statistical agencies and extension services" (e.g., USDA's Natural Resources Conservation Service); and "state/local extension staffs" (see Appendix B).

Lack of confidence in indicator data is found frequently in intergovernmental program assessments (e.g., DeStefano, Hasazi, and Trach 1997; General Accounting Office 1997b, 15-16 and 23-25). Weaknesses were found regarding the data to be collected by a sample of 24 national GPRA performance plans reviewed by the U.S. General Accounting Office (2000, 5-6).

Of the reviewed performance plans of these 24 federal agencies (for the years 1999 and 2000), *none* provided for performance data that could merit *full* confidence. Plans for data collection merited "general confidence" in four of the assessed plans, and merited the lower rating of "limited confidence" in the other 20 plans. Federal agencies commonly face numerous challenges in verifying the validity of indicator data which is reported to them by state/tribal-level agencies (General Accounting Office 1997b, 15-16).

[20] Selecting a *realistic* outcome target, to be achieved by a given date, is based on several factors. These factors include: (a) a solid indicator reading of *baseline* conditions; (b) information on positive and/or negative *trends* in the factors related to the baseline conditions; (c) *expert rating* of the severity of the

outcome targets: (a) by *each* of the five priority animal species--beef cattle, dairy cattle, poultry, swine, and mixed livestock, and; (b) by all 47 animal waste management projects *across* the five species.

C Each project indicated *annually its extent of progress* toward achieving its outcome target. Outcome data were expected to show increasing proportions of (a) animal units receiving adequate application of waste management practices, and (b) projects that met their respective targets for percentage of AU's to be covered by adequate applications of practices.

Indicator data characterized outcome targets, outcomes, and extent to which 1995 outcomes matched the targets to be achieved by 1995 (see Appendix C for these data regarding individual projects of the Targeted Program). Below are illustrative findings from the analysis of outcome indicator data across projects.

Monitoring Outcomes Associated With Project Outputs

Data provided in response to the standardized outcome indicator were analyzed so as to answer two, program-level assessment questions about *outcomes* associated with the animal waste management projects: (a) "To what extent did producers, on average, increase coverage of AUs with 'adequate' animal waste management practices?" (b) "To what extent did any such increase in coverage reach the *expected* amount of progress, i.e., the average *target* for coverage of AUs with adequate waste management practices." Indicator data were inspected for *outcomes* aggregated *across* the projects for each of the identified species, and *across* all the 47 animal waste projects.

Outcomes associated with project implementation are indicated by changes in the mean percentage of AUs receiving adequate application of recommended animal waste management practices. Overall adequate coverage by recommended practices, across *all five animal species/wastes* (47 projects) was as follows: *forty-four percent* at the 1992-93 baseline, and; *fifty-two percent* by 1995, the end of the reporting period (Marshall and Bennett 1998, Vol. Two).

For the 24 projects addressing dairy cattle's waste the percentage of AUs treated by such recommended practices rose from 19 percent at the baseline to 28 percent at the close of the reporting period (Figure 3). Outcome findings show that dairy producers in the geographic areas of the Targeted Program *made progress* in applying waste management practices that hold dairy animal waste runoff and/or

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problems being addressed and the resources needed to reach accepted standards; (d) *experience* in observing what is realistic to achieve within a defined time period, based on *past assessments* of comparable projects; (e) magnitude of *available programming resources* for the time period; and (f) the parallel and collaborative, as well as divergent, work of *other public sector and private sector influences*.

Figure 3. Best Management Practice Coverage of Dairy Cattle Animal Units in Project Areas Relative to Target for Increased Coverage

	No. of States Participating	Animal Units in Project Areas	Number and Percentage of Animal Units with Adequate Best Management Practices in Use	
1995 Target	*24*	*3,508,940*	*998,599*	*28%*
1992-93[21]	24	3,376,040	686,076	19
1994	24	3,644,582	909,944	25
1995	24	3,626,252	1,023,252	28

infiltration to an acceptable level. Such progress *moves toward achieving the national goal* to reduce or prevent water quality degradation through improved management of animal wastes.[22]

The observed average outcome *reached the average target* of 28 percent coverage of dairy cattle animal units -- i.e., reached the 1995 program-level target which was set in 1992-93. In other words, average *progress* in covering dairy cattle herds with adequate waste management practices matched the average target for such coverage.[23]

Number of dairy animal units tracked in the 24 project areas (e.g., 3,626,252 AUs in 1995) is a factor in suggesting the *total magnitude* of producers' practice change associated with the projects for management of dairy cattle's wastes. In order to gauge the collective magnitude of practice changes in a project area, one might multiply (a) the percentage increase in AU coverage receiving adequate application of waste management practices, by (b) the total number of AUs in the project area.

Outcomes vs. Impacts

The animal waste management projects of the Targeted Water Quality Program were *not necessarily responsible* for (a) the observed trend in the outcome indicator over 1992/93-1995, nor (b) the extent to which the 1995 outcomes achieved the outcome targets set for 1995. The quantitative outcome

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[21] Baseline data were from either 1992 or 1993, whichever was a project's first year of CSREES-approval of its indicator data. Based on its quality-monitoring procedure, CSREES was not able to approve some projects' 1992 submissions of indicator data. Data of some projects were first approved in 1993, as they became sufficiently upgraded in quality and were then resubmitted to CSREES.

[22] Even though producers made the expected amount of progress toward *coverage* of dairy cattle AUs with adequate animal waste management practices, average outcome by the close of the 1992-1995 reporting period suggested *much* remaining need for greater coverage of dairy cattle AUs. Thus, the 1995 outcome data provided a *needs assessment* for planning successive water quality programs, i.e., for 1996 and beyond.

[23] This matching of a 1995 observed outcome with an outcome target set for 1995 was a *rarity* within the assessment findings for the Targeted Water Quality Program. Targeted outcomes for most of the other categories of animal species, and for most of the pesticide application goals and fertilizer application goals, were not reached by the close of the four-year plan-of-work period.

indicator, i.e., *percentage of AUs receiving adequate application of waste management practices,* by itself, lacks evidence that its values were *caused or influenced* by project outputs (Bernstein 1999; General Accounting Office 1997b, 3; General Accounting Office 1998a, 3; General Accounting Office 1998c, 4; and Perrin 1999).

Thus, it must be clarified that the progress observed is *associated or correlated with* projects' implementation, not necessarily influenced by them.[24] In other words, extent of progress toward reaching outcome targets was *monitored, i.e., tracked*, but extent of program impact contributing to the overall progress was *not evaluated*.[25]

Anecdotal Data

Projects of the Targeted Program selected and reported narrative cases in order to illustrate their respective accomplishments. Most of the narratives described projects' promotion of specific animal waste management practices for use by producers; and, extent of adoption by producers of these project-recommended practices also was commonly reported.

Some reports cited technological, economic, and environmental impacts from animal waste management projects of the Targeted Program. *Impacts perceived* by project staffs generally are not impacts in the statistically-inferred sense (Rosi, Freeman, and Lipsey 1998), as project staffs usually are not able to separate project influences from other influences on outcomes.

A selection from a narrative accomplishment report is included below. The report exemplifies the type of anecdotal outcome data received from projects including data that implies project impacts.

> In the watershed for New York City's water supply ". . . project staff helped 40 dairy farmers to determine the overall nutrient status of their respective farms. The purpose was to optimize cropping use of manure nutrients so as to reduce their runoff and infiltration. Whole farm plans, for ten

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[24] It might be reasonably asserted that the positive outcome trend was *partially* attributable to the program, i.e., achieved partly through its projects' efforts. The projects expended a significant amount of resources to implement plans of work; and their objectives preceded, and were consistent with, the observed direction of outcome trends. However, the observed outcomes were *not* compared with outcomes in the absence (or statistically estimated absence) of the projects. Therefore, *net effects--i.e., impacts*--of the Targeted Program are not demonstrable or inferred as they would be in a program evaluation (General Accounting Office 1998a; Hatry 1999; 15, 21-22; Nowak et al. 1997b; Perrin 1998; Rossi, Freeman, and Lipsey 1998).

[25] Impact evaluations provide accounts of specific influences of projects, including *how and why observed outcomes occurred* (Perrin 1999; Bennett and Rockwell 1995; General Accounting Office 1998a, 3; and General Accounting Office 1997b, 3 and 30;). Generally, *several influences* together bring about any given impact, including influences of private organizations and public sector agencies (including extension programs through implementing adaptive research, information transfer and education).

demonstration farms in the project area, were 95% implemented by 1995. All 40 *participating farmers adopted the majority of nutrient management practices promoted*, e.g., manure spreading plans. New manure storage structures were completed on two participating farms."

Costs of Selecting and Using Indicators

Costs of *program* (vs. fiscal) management and assessment for the *overall* Targeted Water Quality Program were comprised largely of the costs of selecting and using program indicators. "Indicator use" encompassed CSREES communication of the indicators to projects of the Targeted Program; projects' acquisition and submission of indicator data; CSREES quality-monitoring and analysis of indicator data; and CSREES use of indicator-based information in program management and assessment.

Selecting the program-level indicators, communicating them to the state Extension Services--and quality-monitoring and analyzing the indicator data--required inputs from 20 staff at the program level.[26] *Quality-monitoring* of the indicator data submitted by projects: (a) determined whether they met criteria for being incorporated into the Targeted Program's database of plans-of-work and accomplishment reports; and (b) resulted in all projects *re*-submitting their indicator data one or more times each year, in order to *upgrade the accuracy of their indicator data* to an acceptable level.[27]

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[26] These included inputs by the following CSREES staffs, i.e.: ten extension water quality program staff; two planning and reporting system staff; two computer systems staff; and two administrative staff who requested, guided selection of, and finally approved the program-level indicators; and two support staff. A university cooperator and an independent contractor also were involved at the program level.

[27] Project plans-of-work and accomplishment reports were quality-monitored each year, immediately after they were submitted, for completeness, internal consistency, and face validity. This monitoring included program staff asking project coordinators to (a) verify whether indicator data that were deemed questionable had been submitted as intended, and (b) re-submit their reports within a few weeks after being contacted by CSREES for discussion of incomplete and/or inconsistent data. CSREES used checklists to monitor the state-submitted project plans-of-work and accomplishment reports. Following is an *excerpt* from the checklist form regarding submitted data to indicate project *outcome target* for 1995:

"Please supply any additional information needed for your FY 1992 plan of work.
An encircled "NO" response to a question below indicates missing data.
An encircled " ? " response indicates need for discussion to clarify data and/or resolve apparent inconsistencies with other data you provided. Provide additional data or amend it in your reply."

Animal Waste Management Target for 1995

a.	Is there projection of the the number of animal units for which recommended practices are to be used by 1995?	YES	NO	?
b.	Are the total number of animal units in 1995 projected?	YES	NO	?
c.	Is the term "animal unit" interpreted correctly?	YES	NO	?

As a result of checklist use, *within each year* (1992-95) project-level staffs supplied supplementary and/or corrected indicator data through telephone, U.S. mail, e-mail, and/or fax messages. These supplementary data were needed to *upgrade to CSREES standards* the quality of the plans-of-work and accomplishment reports for inclusion in the national database.

Development of a national database, from the indicator data submitted, required CSREES to provide assistance to its water quality staff--by recruiting a state university cooperator and a private contractor.

- The university cooperator first helped to develop and implement *procedures for quality-monitoring the submitted data*; later, the cooperator developed the national database and led in its analysis for preparing the national report on the program (Marshall and Bennett 1998).

- CSREES water quality program staff initially quality-monitored the indicator data submitted. Then, a contractor worked under CSREES supervision to help projects *meet CSREES's quality-monitoring standards* for the data to be incorporated into the national database.

Responses to the indicators came from at least 220 staff members of the 53 state Extension Services that participated in the Targeted Program. The 220 project-level staff members included *water quality staffs* as well as state coordinators responsible for reporting plans-of-work and accomplishment reports to CSREES.

The 53 state project coordinators first retrieved the national indicators imbedded in the electronic form for submitting data responses. Data acquisition for project planning and assessment was then implemented. Indicator data were obtained and entered into the electronic form; then, project coordinators submitted project plans-of-work and accomplishment reports to CSREES.

Costs of developing and operating the Targeted Program's data-based management and assessment system are estimated at a total of $2.76 million. This included estimated expenditures of:

- $720,000 borne by CSREES, over 1991-1998, to establish and implement the Targeted Program management and assessment system, including preparation of system-wide national reports on the Targeted Program.

- $2.04 million by state water quality projects in order to respond to the management and assessment indicators of the Targeted Program; acquisition of *quantitative indicator data* requires many more resources than are required to acquire *only* narrative (anecdotal) data.[28]

From August 1992 through April 1996, CSREES and its contractor expended an average of more than *two staff days per project per year* in order to complete the required quality-monitoring and obtain adequate upgrading of re-submitted data. In *each of these four years*, the process of monitoring and upgrading the submitted data required an average of *eight to ten* closely repeated "communications" (e.g., contacts via voice or fax telephone, e-mail, U.S.mail, or personal visit) between CSREES and/or its contractor, on the one hand, and *each* state Extension water quality team, on the other.

After the quality of a submitted state plan-of-work and/or annual accomplishment report reached approval standards, the approved project documents were forwarded to the university cooperator to be included in the national database for the Targeted Water Quality Program.

[28] Average annual cost per project--for preparing to submit, submitting, and re-submitting water quality plans-of-work and accomplishment reports--is estimated to have been 12 percent of a full-time equivalent (FTE), or $9,600. This assumed an average cost of $80,000 per state/county Extension professional FTE (including fringe benefits, in-service training, program assistants, secretaries, office space, transportation,

Total resources for the Targeted Program over 1992-1995 included CSREES' contribution of $11.3 million, combined with non-federal resources estimated at a value of 33.9 million (Marshall and Bennett 1998, Vol. One). Therefore, the total cost of $2.76 million for the program's system for management and assessment amounts to an estimated six (6) percent of the total estimated resources expended on the Targeted Program, 1992-1995. The projects' expenditure of $2.04 million in order to be federally accountable constitutes 18 percent of the funding they received from CSREES.[29]

Evaluation of Approach and Recommendations

Following is an evaluation of the (a) *approach* taken to select the Targeted Program's management and assessment indicators, (b) *qualities* of these indicators; and (c) *methods for indicator use*, i.e., in data collection and controlling the quality of indicator data. *Lessons suggested by the evaluation may increase the cost-effectiveness of future systems to manage and assess intergovernmental programs*. These lessons may be generalized beyond CSREES water quality programming, and are intended to strengthen selection and use of indicators for intergovernmental programs, including indicators for use in implementation of the Government Performance and Results Act (GPRA).

Recommendations to program-level agencies regarding strategies to select and use indicators for intergovernmental programs and intergovernmental projects are suggested below. These recommendations are based upon generalization from the observations made and experiences evaluated in the course of developing, conducting, and assessing the information system described in this paper.

Lessons on Locus of Indicator Selection

Indicators of the Targeted Water Quality Program's information system were selected at the program-level, the approach described by Rieper and Toulemonde (1997, 154) as "governments assess together with one of them leading the way." For guidance of future systems for intergovernmental program management and assessment, this approach is compared with the project-level and the joint-level selection approaches. Experience in program-level selection is compared with current observations of, and past experiences with, use of the other two, generic approaches to indicator selection. Advantages and disadvantages of the three approaches will be viewed from the program-level, rather than the project-level, perspective.

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communications and communication technology, and other equipment and supplies). Based on the average FTE cost estimated above, the total *annual* data collection and reporting cost for the 53 state projects in the Targeted Program is estimated at $509,000 during the period FY 1992-95. State Extension Services generally regarded the program's indicators as requiring excessive project resources for collecting and reporting outcome data.

[29] This accountability cost to projects may be placed in perspective by comparing it with costs of systems of competitive grant proposals to ensuring accountability. Projects of the Targeted Program received CSREES funding through submitting proposals of sufficient *merit*, without the risk of losing competitions in a competitive proposal system. Considering that most grant programs fund only a *minority* of competitive proposals submitted, the competitive grant approach may in the long run be even more costly to state agencies/state universities than the cost of preparing merit-approved plans of work and accomplishment reports.

Pros and Cons of Program-level Selection

Through employing a *program-level selection* approach, it was confirmed that intergovernmental program staffs:

- can rapidly select indicators with the *capacity to provide adequate*[30] *information* for program-level management and assessment;

- are likely to *encounter severe problems* in acquiring useable indicator data (i.e., in addition to the Targeted Water Quality Program, the 20 other 1992-1995 nationally targeted CSREES programs faced severe problems in acquisition of project-supplied indicator data).[31]

CSREES expected that staff of state projects would systematically collect and report indicator data of adequate quality to be entered into their plans-of-work and accomplishment reports. Instead, most project staffs initially expended *minimal* resources to collect and report indicator data: their initial reports to CSREES were incomplete, often inconsistent, and usually behind schedule.[32]

These problems encountered in data acquisition stemmed in part from the program-level approach to select indicators for the Targeted Program. Project staffs' minimal effort in providing data in response to the indicators was due in part to *their lack of involvement* in selecting them. Project staff had limited familiarity with, understanding of, consensus regarding, and commitment to the indicators--perceiving them as having limited usefulness to their respective projects.[33]

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[30] In addition to the authors of this paper, the following considered the CSREES-selected indicators to be adequate for the Targeted Program: CSREESs' water quality staff and administrative staff that served from 1992-1996; an eleven-member national consultative panel representing state Extension Services; and several university consultants (see Acknowledgments).

[31] Directors of state Extension Services had collectively agreed that their staffs would supply data needed by CSREEES through responding to a limited number of CSREES-selected indicators for national program management and assessment; however, state project and administrative staffs lacked follow through in actually supplying the CSREES-requested data. Most state Extension administrations exerted insufficient quality control over their staffs' submission of project indicator data to ensure that their collective promise to supply indicator data to CSREES was fulfilled.

[32] This experience matches findings of a survey of 20 federal departments and agencies regarding their *most frequent challenges in data collection* regarding performance measurement (General Accounting Office, 1997b, 15-16). The survey found that the most frequent challenges faced were "using data collected by others;" "ascertaining the accuracy and quality of performance data;" and "acquiring performance data in a timely way."

[33] The indicators selected by the Targeted Program staff were found to be of *some use for project purposes,* i.e., for management and assessment at the multi-county/state levels. The uses included: guiding the development of materials to inform and educate project audiences; responding to inquires about the projects; and assistance in allocating funds within projects (Frost-Kumpf and Schutjer 1999, 34).

Other factors leading to the low quality of the indicator data initially submitted were project staffs:' (a) minimal time and expertise for collecting and reporting outcome data; and (b) tendency to believe that responding to the indicators was only a nominal requirement for obtaining and continuing CSREES funding for their projects (Frost-Kumpf and Schutjer 1999, 35-36).

Low quality of indicator data received from the projects required ameliorative response by CSREES water quality program staff, i.e., *quality-monitoring of the submitted data*. This type of action frequently is taken by federal agencies that encounter difficulties in using indicator data received from other agencies. Such federal agencies often employ procedures to verify and validate data received; this includes asking other agencies to correct their data when it is found to be of insufficient quality (General Accounting Office 1997b, 23-24), as occurred in the Targeted Water Quality Program.

The CSREES water quality team was able, with *considerable internal effort and the help of a state cooperator and a contractor*, to effectively employ the indicators that the program-level indicators that the team had selected. The indicators were used over a four-year cycle of program planning, implementation and assessment, and this paper is based on the resultant national accountability report. However, continuation of the magnitude of quality-monitoring required to implement the program-level approach to indicator selection was deemed by both CSREES and state Extension Services to be too costly to be continued for additional program cycles. CSREES now is developing a new national system for reporting plans and accomplishments of extension programs; the proposed system is expected to rely heavily on indicators selected at the project level, but also include jointly-selected indicators (Ladewig 2001).

Pros and Cons of Joint-level Selection

"How does the quality of indicator data fare if program staff *and* project staffs *jointly* select the indicators?" This approach may be described as "governments assess in partnership" (Rieper and Toulemonde 1997, 152-154 and 164). Such a collaborative approach should (a) reduce project staff perceptions that the indicators are "just a burden" required by the program, (b) serve to develop indicators with stronger use at the project level, and (c) maximize efforts by project staffs to acquire and report complete and valid indicator data.

It follows that a *lesser program-level effort* in quality-monitoring data submitted by projects is expected if a *joint-selection approach* is employed. The added, up-front costs of joint-selection might be compensated for, in the long term, by less need for quality-monitoring the data of projects, as well as greater accuracy of submissions of indicator data.

However, projects of the Targeted Water Quality Program relied principally on their *own* reporting systems. Projects submitted to the information systems of their respective state Extension Service field-level quantitative data, as well as narrative reports, that were not submitted to CSREES. Compared with the data collected for the national program indicators, data collected for the project-level reporting systems *were utilized more intensively and frequently* for the purposes of state/local level project management and assessment (Frost-Kumpf and Schutjer 1999, 34).

However, hazards that are cited by Rieper and Toulemonde (1997, 152-154) as well as other hazards may be encountered in jointly-selecting indicators for intergovernmental programs. An instance is an (unnamed) intergovernmental agency's recent iterative process for building a consensus on a program's goals and associated indicators. Project leaders helped to develop program goal statements as well as to select indicators of project outputs and associated outcomes.

Current adequacy of indicators for the unnamed intergovernmental program is questionable, in the view of the authors of this paper. Weaknesses in the current indicators are due partly to difficulties in reconciling *divergent views* between program and project levels. During the process to develop a consensus on indicators, project leaders and leaders of the program expressed *differing* views on what kinds of data should be collected.[34] Project staffs resisted collection of indicator data that could be generalized at the program level, leading to a multiplicity of indicators each with narrow applicability. These indicators do provide quantitative data regarding individual projects, but are *too fragmented* to provide information for program management and assessment.

The principal reason for program-level weakness in the jointly-selected indicators appears to be the greater *combined strength* of the project leaders compared with the strength of the program managers: the former have a collectively stronger political and/or administrative base nationally. Thus, it was difficult (within the consensus-building process utilized) to establish indicators that could adequately represent the informational needs of the program partner. Selecting management and assessment indicators does not occur on a neutral stage; rather, such choices are bound by political realities (Forester 1989).

Pros and Cons of Project-level Selection

Merits for program staffs in using *project-level* selection of indicators for program management and assessment include the following: (a) probable feasibility of assembling for program level use qualitative indicator data from a series of relevant project-level case studies; (b) considerable stability in the types of project indicator data available, in so far as the project-selected indicators are part of on-going state agency information systems; (c) relief from necessity of "pushing" project staffs to collect and report indicator data that is of use primarily at the program level (i.e., as in when indicators have been selected at the program-level); and (d) relief from responsibility for developing with project staffs a true consensus on indicators (via genuine joint-level selection).

However, the overall value of program-level reliance on project-level indicators appears to be *moot at this point in time.* A questioning of the potential success of using a project-level approach to indicator selection is based upon the following:

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[34] Joint-selection assumes that it generally *is possible to reach a meaningful consensus* on indicators to serve both program and project levels. However, these levels have different responsibilities relative to management and assessment. Achieving consensus across program and project levels generally *resists post-modernism,* a growing philosophical view that disparate groups generally hold and maintain such strongly differing views, on matters of high concern to them, that these views cannot be bridged, or bridged only with great difficulty (Roberts 1999).

- the previously mentioned difficulties in, and the large program-level resource demands for, attempting to *generalize* about a national program and associated outcomes from project-selected indicator data (Bennett 1996; Tate 2001).

- a negative evaluation of reliance on use of project-selected indicators for management and assessment of the 1982-1986 national extension program for soil and water management;[35]

- issues posed in the literature suggesting caution by governmental agencies in pursuing development of the "datamart" approach, which relies on data from project-level indicators.[36]

Even if program staff are able to retrieve relevant data from project-level indicators, it may be *impracticable* to *synthesize* such data (data aggregation often will be out the question) in order to support program-level *generalizations.*

Use of indicators selected at the project-level may require excessive amounts of project-level and/or program-level expertise, information technology, and time expenditures to:

- match, transform and/or recode as necessary project-level data into a program-level classification in order to analyze indicator data to prepare reports for program management and assessment; and

- assure that the quality of data stored in a program-level database adheres to accepted standards for data quality.

There may be room for optimism that the project-level indicator approach potentially *can be viable* due to recent improvements in computer-based tools. Such tools include those for transforming and/or recoding data from project-level frameworks to program-level frameworks, and developing and querying databases (Baker 2000). The cost-effectiveness of these information technologies for utilizing project-selected indicator data in program management and assessment should be tested through conducting robust, multi-year pilot projects.

Recommendations on Locus of Indicator Selection

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[35] An evaluation of using Narrative Accomplishment Reporting System (NARS) data to assess and manage Cooperative Extension's national program in soil and water quality and conservation included the following recommendation: develop a national accountability system with standard reporting categories and formats to ensure data quality and uniformity (Wright et al. 1986, 8-11). In other words, the evaluation recommended abandoning NARS' laissez-faire, project-level indicators (that provide "no guarantee of essential, program-level information") in favor of employing *program-wide* indicators.

[36] Nguyen (1999) asserts that government agencies should consider alternatives to building and using data warehouses, such as database architecture development and solving data quality problems at the source. Nguyen claims that: many agencies cannot use a data warehouse without prohibitive costs of cleaning data retrieved, and; use of data warehouing frequently faces problems of misreading data fed into the warehouse, lack standardization, and missing or buried data.

Like the other two approaches to selecting indicators, the pros and cons of *joint-selection* need further empirical study (Smith 1999a; Cousins and Earl 1999; and Smith 1999b). However, joint-selection of indicators is viewed as an ideal approach toward which agencies generally should strive (Feller 1995, 22). In addition to its advantages discussed above, the joint-selection approach may be superior in providing a basis for incremental improvements in indicators, as well in providing greater stability in indicators over time.

> Recommendation A: A program's staff should attempt with project staffs *to reach a consensus* on the most appropriate indicators for defining issues, setting project targets, and identifying outputs and associated outcomes.[37]

It is acknowledged that *achieving* joint-selection of indicators *may not be possible or efficient* in some situations. Achieving joint-selection requires (Bennett 1996; Toulemonde and Rieper 1997, 10-12) that program and project levels: have adequate *time* to build a consensus on indicator selection; be *balanced in* power so as to ensure a genuine consensus; and both contribute *developmental resources* to (a) support necessary program-project staff communication and (b) engage indicator-selection expertise as needed.

Likewise, in some situations, it may not be possible or efficient to obtain adequate information for program management and assessment through employing data from project-selected indicators. Reasons for lack of feasibility in using project-selected indicators may match those cited earlier.

When data to minimally satisfy program management and assessment needs cannot be obtained through either joint-selection or project-selection of indicators, then staff at the program level must *lead* in selecting indicators (i.e., employ program-level selection). Such an approach becomes necessary, despite attendant risks including lack of sustainability of the approach. This paper demonstrates that the program-level approach to indicator selection can be furthered by inclusion of indicators that provide *options* from which projects may choose.

> Recommendation B: When program-level selection of indicators is necessary, then the *indicators selected should provide a set of options* (as described and demonstrated herein)--in order to help structure as well as reflect both *commonalties* across and *differences* among projects.

Lessons on Cost-effectiveness of Indicators and Indicator Use

In a previous section of this paper, indicators for the animal waste management component of the Targeted Water Quality Program were rationalized. Observed strong and weak points of both the *outcome indicator* for this component and the *procedures used to collect its data* are discussed below.

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[37] Joint-selection may entail formulation of *composite* indicators that (a) provide summary data meaningful at the program level, and (b) are constituted by aggregating sets of sub-indicators each providing more specific data useful to state/local projects (Bennett 1996).

Recommendations are provided relative to future usage of the approach to intermediate outcome indicator selection and use described herein.

Strengths

At the time of selection of the outcome indicator, i.e., *percentage of AUs receiving adequate application of waste management practices*, it was believed that the indicator was as *proximate to problem solution/reduction* as could be afforded, relative to available resources including the brief programmatic time-frame for indicator usage. The authors continue to maintain that extent of animal producers' application of *practices that generally affect water quality*, i.e., an *intermediate* outcome, is as strong an indication of outcome as could have been obtained.

The rationale originally presented for the animal waste management outcome indicator asserted its *inclusiveness, specificity, and meaningfulness*. Following the indicator's use, the authors continue to assert that the data obtained through the indicator met these three criteria as well as possible, given resource constraints.

> Recommendation C: *Intermediate outcome indicators* having inclusiveness, specificity, and meaningfulness--along the lines of described in and demonstrated by this paper--*are recommended for consideration* in selecting indicators for program management and assessment systems.

Indicator *standardization*, i.e., manure production/potency equilibrated across animal species in terms of a common unit--the animal unit (AU)--was employed in the outcome indicator. *Standardization* of data for the outcome indicator created the necessary uniformity for program-level analyses: equivalent values could be expressed across wide variations in project priorities and activities.

> Recommendation D: If indicators are selected jointly or at the program level, then attempts should be made to *standardize indicators* to allow for aggregating quantitative data across all projects of a program.

Limitations and Weaknesses

Obtaining data on extent of producers' adoption/usage of *specifically identified, project-recommended management practices* (e.g., land application of waste to achieve crop nutrient budgeting) would have increased the value of information about outcomes associated with projects of the Targeted Water Quality Program. However, obtaining such data would have added considerably to the costs of data collection. (Likewise, to have obtained data regarding *intensity* and *accuracy* of producers' use of the project-recommended practices would have been ideal--but also would have been too expensive).

Confidence in data for the outcome indicator is partial, as noted above. Although quality of the outcome indicator data may be questionable relative to standards for conducting scientific research, it is likely that the data are *reasonably complete and accurate* relative to other reporting systems for intergovernmental programs, i.e., data quality appears to compare favorably with other outcome data on such programs (see Footnote No. 19). Questions may be posed about precision of the outcome data obtained. For example, the 50 percent increase in reported coverage of dairy animal units with

adequate best management practices over a four-year period (Table 3) seems questionably high. However, outcome data do provide a *sense of status and direction of trends*, from baseline to outcome, regarding degree of adequacy of animal producers' use of recommended management practices.

Projects generally found it difficult to respond satisfactorily to the outcome indicator, i.e., providing methodologically defensible data in response to the outcome indicator presented a *resource-consuming* challenge for projects. Most projects submitted outcome indicator data resulting from a compromise between methodological adequacy and affordability.[38]

> Recommendation E: If indicators are selected jointly or at the program level, then as available time and expertise permit, *a standard procedure should be developed by which a program's projects* collect data on outcomes, a procedure that can be accommodated to variations in projects and the conditions under which they are conducted. A management and assessment system's data collection procedure should meet at least the rudimentary requirement of data validity and reliability.

For the Targeted Program, the type of indicator data generally having the least quality was the data on *projections*, i.e., *targets for outcomes* to be reached by 1995 (the close of the plan-of-work period). Setting quantitative outcome targets proved to be difficult for staffs of nearly all the projects, a difficulty faced by many agencies (General Accounting Office 1997a, 5). Most project staffs lacked previous experience in setting precise/measurable objectives for outcomes; and few project staff felt that they had a sufficient basis to set precise outcome objectives for their respective water quality projects.[39]

> Recommendation F: Training for intergovernmental project staffs *in procedures for setting outcome targets* generally is advisable. Such training should address the several factors to take into account in making realistic projections for outcomes (footnote No. 20).

Lessons on Monitoring Indicator Data Quality

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[38] Approximately 11 percent of the sources of outcome data were based on methodologically adequate surveys/interviews of producers (i.e., those conducted by state or federal statistical agencies). At the other extreme, 10 percent of the sources of outcome data were only "best estimates" by project staff, based on their field observations (see Appendix B and footnote No. 18). It is unrealistic to assume that every project has the same capability for collecting outcome data. However, the ideal of valid and auditable indicator data collected from reliable sources must not be abandoned.

[39] Röling (1986) warns that *realistic* target setting requires much attention to prior feedback, and careful study into or experience with, targeted conditions and linkages. He maintains that only much understanding of project conditions and potential influences allows for specificity in setting targets (quantitative objectives). Conversely, lack of understanding of the program's environment--and how it operates in its environment-- may lead to setting unrealistic targets--with negative consequences. Röling (1986) advises *refraining from setting quantitative objectives,* in favor of process planning, when little prior experience and/or previous research or evaluation data exist regarding the project or similar projects.

Close monitoring by CSREES of the quality of the indicator data submitted was critically important to obtaining a sufficient quality of data for program-level analyses. Upgrading data quality was necessitated because, for CSREES national programs during 1992-1995, there was limited *institutional* incentive for project staffs to report indicator data to CSREES. This in turn was due to: (a) absence of line-authority by CSREES relative to project staffs; (b) these staffs' perceptions of merely nominal requirements for receiving CSREES's share of the funding of water quality projects; and (c) limited relevance of the program-selected indicators in providing management information needed by the projects. Lack of project staff incentive to report indicator data of adequate quality is commonly faced by intergovernmental programs (General Accounting Office 1997b, 16; DeStefano, Hasazi, and Trach 1997, 126; and Peters 2001, 103).

State Extension staffs have increasingly heavy work loads and concomitant needs to set priorities among their multiple assignments. Therefore, was it realistic to expect such staff to annually provide complete, valid indicator data--to be used primarily for CSREES purposes--without the encouragement and pressure of both supportive and assertive quality-monitoring? Experience generally supports a negative answer to this question.

Noninstitutional incentives motivated and enabled project staffs finally to supply the needed quality of indicator data in response to the quality-monitoring procedure established by the water quality team of CSREES. The team, its cooperator, and/or contractor made *closely repeated* requests--based on use of detailed checklists for ensuring data quality--to immediately and systematically upgrade the quality of submitted indicator data. Along with these requests, water quality project coordinators received *considerable* amounts of sustained technical support, process guidance, and *encouragement* toward re-submitting indicator data of sufficiently upgraded quality (Bennett 1996). These multiple quality-monitoring efforts went far beyond the PPARS policy for monitoring quality of indicator data for national programs.

Noninstitutional incentives for obtaining indicator data of sufficient quality were effective because of the *historically positive working relationships* between state project staffs and staff of the Targeted Water Quality Program, which in turn was based on a long history of cooperative relationships between state Extension Services and CSREES (Rasmussen 1989). Nearly all project coordinators were willing to upgrade their submitted data for the program-level selected indicators. Only one threat to a state project staff--to withhold project funds to be supplied by CSREES until data of improved quality were submitted--was made (but not actually exercised). This single threat must be compared with the many hundreds of quality-monitoring interactions with project staffs over the 1992-1996 period of data collection and quality-monitoring.

> Recommendation G: Quality-monitoring by the program level should include providing projects with adequate amounts of *technical assistance, process guidance, and encouragement* toward re-submission of indicator data with sufficiently upgraded quality. Such quality-monitoring ideally should supply immediate feedback to individual projects when problems are noted in the quality of their submitted data. Key project staff members should quickly supply data that are missing and upgrade data that are inconsistent and/or invalid.

It is presumed that quality-monitoring of indicator data by a program agency can be reduced through use of joint-selection and/or project-selection of indicators, as compared with selection of indicators at

the *program-level* or at the project-level. Extent of necessity for quality-monitoring data in response to jointly-selected or project-selected indicators will become evident as these approaches to selecting management and assessment indicators are implemented and evaluated.

> Recommendation H: *A documented quality-monitoring process should be budgeted for and employed in approving project indicator data for inclusion in an intergovernmental program management and assessment database*, regardless of whether indicators are selected at the program level, at the project level, or jointly by both levels.

Overall Recommendation on Corralling Indicator Data

Effectively obtaining indicator data to manage and assess an intergovernmental program depends upon a complex interplay of many factors, i.e., locus of indicator selection, indicator attributes including embedded options for projects, procedures for collection of indicator data; magnitude of need for and resources available for quality-monitoring of indicator data; and positiveness of working relationships between program staff and project staffs. The cost-effectiveness of indicator selection and use based on the combined effect of these factors and is not easily anticipated; rather considerable empirical testing is necessary to chose a workable approach.

> Recommendation I: Prior to *full-scale* development of the information system for any intergovernmental program, the intergovernmental partners should conduct multi-year *tests of cost-effectiveness* of one or more prototype systems. Such tests should include determining whether system users (e.g., administrators, program staffs, and the general public) *can effectively and efficiently retrieve and utilize indicator data or information for their respective purposes*.

Summary

This paper is intended to assist intergovernmental program staffs in selecting strategies for obtaining from intergovernmental projects quantitative indicator data of satisfactory quality. The intent includes helping federal agencies meet requirements of the Government Performance and Results Act (GPRA). The Act mandates that federal programs employ *quantitative indicators*, in so far as possible, in order to improve program management and assessment.

Conducting programs that are effective and politically acceptable often necessitates *cooperation* by two or more levels of government, i.e., intergovernmental programming. In many countries, intergovernmental programs constitute one of the most important types of programs for delivering services to the public.

Agencies of higher-level governments lead *intergovernmental programs* by funding, guiding, and assessing their *intergovernmental projects,* which are conducted by agencies of lower-level governments at multiple sites. An intergovernmental program must provide for (a) *order and similarity* across its component projects; (b) *flexibility* for its projects to respond to varied situations; and (c) *indicators* for program *management and assessment.* Such indicators can help to structure as well as identify *common features* across and *differences among* intergovernmental projects.

Agencies of higher-level governments often face several types of barriers in obtaining quantitative indicator data for intergovernmental program management and assessment. These include barriers to (a) employing quantitative indicators that are *common* to all the projects of a program, and (b) obtaining *uniform and credible* quantitative indicator data from projects. This paper describes an *approach employed to overcome these two types of barriers* to acquiring quantitative indicator data on *commonalties across* a program's projects and *variations among* them

An intergovernmental program may rely on one or more of the following alternative approaches to providing indicator data. Alternative one is *program-level selection* of indicators. Alternative two is *project-level selection* of indicators. And alternative three is *joint-selection*; i.e., the program and the project levels come to *a consensus* on indicator selection. This paper presents an *approach to program-level selection* of indicators that includes providing a *series of options* for project-level reporting of plans-of-work and accomplishments.

To describe the approach employed, the paper reviews the information system for a recent intergovernmental program of the United States Department of Agriculture (USDA), i.e., the National Extension Targeted Water Quality Program. The Targeted Water Quality Program's information system for management and assessment generally was consistent with requirements of the Government Performance and Results Act (GPRA).

The Targeted Water Quality Program had five goals for achievement through its state/county projects. These goals were to: reduce or prevent water pollution from wastes of farm animals, commercial fertilizers, and crop pesticides; protect or improve water quality through collective action; and protect or improve quality of drinking water from private domestic-use wells.

USDA's Cooperative State Research, Education, and Extension Service (CSREES) selected indicators for the projects of the Targeted Water Quality Program. The indicators provided projects with *successive options* in order to (a) accommodate the wide variability among the projects, as well as (b) minimize projects' costs of collecting and reporting data to CSREES.

A single component of the Targeted Water Quality Program, i.e., management of animal wastes to prevent/reduce water pollution, is chosen for this paper in order to *illustrate* the nature, logical progression, and use of indicators that were employed for the program's other four components. Each animal waste management project reported *only* on its efforts to combat the *type of animal waste* identified as *most threatening* to water quality in the state in which the project was located. The paper presents *commonalties* and *differences* across (a) the 47 projects that collectively addressed the wastes of five species of farm animals; and (b) those 24 animal waste projects that had as their highest priority the management of *dairy cattle's wastes*. Both these analyses focused on only the greatest animal waste threat to water quality in the states in which the projects were located.

Options provided by the first four of the five indicators for the animal waste management component guided an individual project's selection of: type of water quality problem to address; priorities and objectives; scope; and outputs. Options selected by a project were reflected by the indicator data it reported to CSREES. *Data on outcome targets* and on *outcomes* were reported by all projects

according to the fifth indicator. Standardization of this outcome indicator permitted *aggregating outcome data across all* the animal waste management *projects*, *regardless* of animal species chosen for project reporting.

Projects initially submitted indicator data of low quality in response to the indicators selected by CSREES. This required the water quality team of CSREES *to closely monitor* the quality of the indicator data submitted. Project coordinators received *repeated requests to upgrade* the quality of submitted indicator data, along with considerable amounts of sustained technical support, guidance, and encouragement toward re-submitting indicator data of sufficiently upgraded quality. Indicator data from all projects eventually was upgraded sufficiently to meet standards for inclusion in the database for the national program.

An evaluation of the cost-effectiveness of the approach to indicator selection and use employed leads to recommendations for selecting and using indicators for intergovernmental programs. "Lessons learned" from evaluating the employed approach suggest its use under a series of specified conditions. Program-level selection of indicators *having a series of options from which projects may choose* is recommended when (a) project-level selection and/or joint-selection of indicators do not provide adequate data for intergovernmental program management and assessment; (b) resources are available for intensive quality-monitoring of project-submitted indicator data; and (c) noninstitutional incentives, such as positive working relationships between program and project staffs, can go beyond institutional incentives in motivating project-staffs' submission of indicator data of sufficient quality. Recommendations provided to guide selection and use of management and assessment indicators address: locus of indicator selection; attributes of outcome indicators; procedures for collecting indicator data; quality-monitoring of indicator data; and pilot-testing approaches to indicator selection and use.

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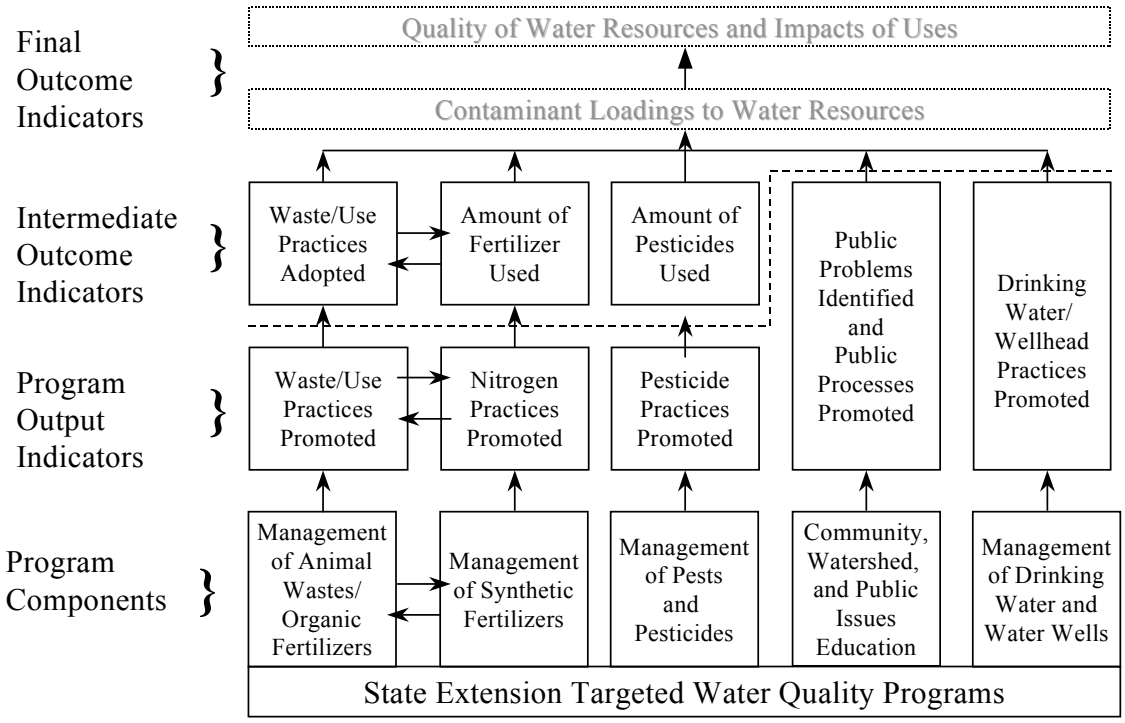
Appendix A - Scope and Structure of the Targeted Program

All five components of the National Extension Targeted Water Quality Program included *output* indicators, and three components also included "*intermediate outcome* indicators" (Figure A1). The intermediate outcome indicators characterized changes in patterns of behavior. Such intermediate outcomes influence "final outcomes."

Two components of the Targeted Water Quality Program — collective action/public issues education, and drinking water well quality — were assessed only in terms of their respective *output* indicators. For these two program components, no workable outcome indicators could be devised in the time available for indicator development, or desired indicator data regarding outcomes were found to be unavailable.

Figure A1: Indicators for National Extension Targeted Water Quality Program



Appendix B - Sources of Data for Outcome Indicator

In their multi-year plans-of-work, state project staffs identified specific source(s) from which they would collect data in order to respond to the standardized indicator for monitoring outcomes associated with the animal waste management component of the Targeted Water Quality Program. The outcome indicator was percent adequate coverage of animal unit (AUs) by recommended waste management practices. Projects supplied the indicator data they collected in annual reports submitted to CSREES.

Several data sources were accessed (Table B1) in order to track the percentage of animal units covered by management practices adequate to hold animal waste runoff and/or infiltration to an acceptable level. Methods of obtaining such data varied by state.

Table B1. Sources of Data on Extent of Management Practice Coverage of Identified Animal Species in Project Areas

	47 State Projects Participating		
		Percent of	
Published Secondary Sources	Number	Projects	Sources
Agencies other than statistical agencies & Extension	26	55%	32%
State/Federal statistical agencies	9	19	11
USDA water quality projects	6	13	7
Primary Sources and Unpublished Secondary Sources			
Extension surveys of producers	14	30	18
Private industry staffs	14	30	18
State/local Extension staffs	8	17	10
Source not identified	4	9	5

The first-ranked data source for the outcome indicator was "agencies other than statistical agencies and state Extension Services." These agencies--such as USDA's Natural Resources Conservation Service and its Farm Service Agency--provided data, from their own published or unpublished reports, for the animal waste management outcome indicator: they provided indicator data to more than half (55%) of the projects participating in the animal waste component. Nearly one-third of the (typically multiple)sources of outcome data were "other program agencies."

The second-ranked sources were in a tie. Fourteen (14) projects specifically identified Extension-conducted *surveys* or *interviews as the principal* methods for collection of outcome data. Also, fourteen projects identified the livestock or poultry industries as sources of such outcome data. Third-ranked source of data on outcomes was field observations made by state/local Extension staffs.

Appendix C - Inventory of Project Targets and Outcomes -- Dairy Cattle's Waste

STATE	TYPE OF WASTE	Outcome Targets for 1995		1992-93 Baselines [e]		1994 Outcomes		1995 Outcomes	
		ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES INTENDED	ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES WERE USED	ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES WERE USED	ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES WERE USED
California	Dairy Manure	590,000	59,000	590,000	45,000	590,000	67,850	590,000	67,850
Connecticut	Dairy Manure	71,500	11,000	71,500	18,800	71,992	18,152	71,992	18,152
Florida	Dairy Manure	17,350	10,000	17,350	15,000	16,000	15,000	15,620	14,600
Idaho	Dairy Manure	200,000	200,000	185,000	165,000	217,000	195,000	225,000	205,000
Illinois	Dairy Manure	185,100	71,600	184,700	61,600	184,800	64,100	184,900	66,600
Kentucky	Dairy Manure	5,000	2,200	5,000	2,200	5,000	2,200	4,750	2,090
Maine	Dairy Manure	70,000	50,000	70,000	35,000	70,000	38,500	70,000	39,000
Michigan	Dairy Manure	18,600	4,300	18,600	2,200	19,050	3,312	19,050	3,402
Minnesota	Dairy Manure	359,000	39,500	418,700	21,000	418,700	28,000	418,700	36,587
Mississippi	Dairy Manure	49,840	14,940	49,840	5,170	49,840	10,980	49,840	13,003
Missouri	Dairy Manure	11,200	7,467	11,200	420	11,200	750	11,200	861
Montana	Dairy Manure	750	750	750	250	700	500	700	700
N Hampshire	Dairy Manure	40,000	35,000	40,000	20,000	40,000	35,000	40,000	35,000
New Mexico	Dairy Manure	7,000	4,000	40,000	3,000	65,000	13,000	67,000	16,000
New York	Dairy Manure	28,000	2,800	20,000	0	28,000	560	28,000	2,800
Pennsylvania	Dairy Manure	865,900	173,180	865,900	86,590	865,900	129,885	869,900	173,180
Rhode Island	Dairy Manure	5,600	4,667	5,600	980	5,600	980	5,600	980
Tennessee	Dairy Manure	275,000	110,000	275,000	63,315	266,000	76,120	250,000	75,505
Texas	Dairy Manure	105,000	56,000	103,000	38,600	105,000	74,200	105,200	90,000
Utah	Dairy Manure	11,200	1,600	11,200	800	11,200	800	11,200	1,200
Vermont	Dairy Manure	237,700	83,195	237,700	77,211	237,300	104,175	232,400	127,820
Virginia	Dairy Manure	190,000	20,000	190,000	6,380	190,000	6,380	190,000	6,548
Washington	Dairy Manure	140,000	15,000	140,000	10,000	140,000	14,500	140,000	15,950

STATE	TYPE OF WASTE	Outcome Targets for 1995		1992-93 Baselines [e]		1994 Outcomes		1995 Outcomes	
		ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES INTENDED	ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES WERE USED	ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES WERE USED	ANIMAL UNITS IN REPORTING AREA	ANIMAL UNITS ON WHICH PRACTICES WERE USED
Wisconsin	Dairy Manure	25,200	22,400	25,200	7,560	25,300	10,000	25,200	11,000
TOTAL - 24	**DAIRY CATTLE'S**	**3,508,940**	**998,599 28.5%**	**3,576,040**	**686,076 19.2%**	**3,633,582**	**909,944 25.1%**	**3,626,252**	**1,023,828 28.3%**

[1] The earlier, quality-monitored figure reported-- either 1992 or 1993 data-- was entered.

Acknowledgments

The management analysis and assessment project on which this paper is based was conducted through a cooperative agreement between the Texas A&M University (No. 93-EWQI-1-9052) and the Cooperative State Research, Education, and Extension Service (CSREES)--United States Department of Agriculture (USDA).

The cooperative agreement engaged the following Texas A&M University faculty or staff members: Mary Marshall, B. L. Harris, and Julie Jones. Claude Bennett served as CSREES liaison for the project. Through a contract with CSREES, James Davis performed quality-monitoring of indicator data for developing the project's national database.

The basis for this paper, the 1998 multi-volume assessment report, *National Extension Targeted Water Quality Program, 1992-1995*, was prepared with the guidance and support of the eight member CSREES Extension water quality staff that served from 1990 through 1996. Andrew Weber, Chair of the 1990-1996 CSREES Extension Water Quality Staff, established the University Consultative Panel for Accountability that advised on preparation of the multi-volume assessment report.

The University Consultative Panel guided the management analysis and assessment project by suggesting ways to analyze the indicator data and present the findings to national and state audiences. The Consultative Panel represented a mixture of administrative staff members, water quality project staff members, and program evaluators drawn from eleven state Extension Services across the United States. The Panel was comprised of the following members:

Fred Bergsrud (University of Minnesota)
Arthur Gold (University of Rhode Island
Gary Jackson (University of Wisconsin)
Dalton McAfee (North Carolina A&T University)
Gerald Miller (Iowa State University)
David Smith (Cornell University)
Elbert Dickey (University of Nebraska)
B. L. Harris, *Chair* (Texas A&M University)
Roy Jeffrey (University of Connecticut)
Rob McDaniel (Washington State University)
Richard Poling (University of Tennessee)
John Watson (University of Arizona)

Consultation on database development and/or analysis was provided by the following individual university faculty, of whom several were members of state projects of the Targeted Water Quality Program.

Lee Frost-Kumpf (University of Illinois-Springfield);
Rodney Holloway, (Texas A&M University)
Margery Mortvedt (Kansas State University)
John Sweeten (Texas A&M University).
Cliff Hoelscher (Texas A&M University)
Mark McFarland (Texas A&M University)
Merritt Taylor (Oklahoma State University)

The individuals named below have been asked to provide review comments on this draft paper. *Asterisks* following names indicate response, i.e., provision of review comments, for which the authors are grateful. Only those who provide review comments, and sanction listing of their name, will be included in any published version of this paper.

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